

Claims:

1. An electroactive device, comprising:  
5 at least two layers of material, each layer having a length, width and thickness dimension; wherein at least one layer is an electroactive material and wherein at least one layer is of non-uniform thickness; and  
means for bonding the layers to one another.
- 10 2. The electroactive device of claim 1, wherein the at least one layer of electroactive material further comprises means to supply electrical signals across the thickness thereof.
- 15 3. The electroactive device of claim 2, wherein the means to supply electrical signals is at least one electrode positioned on each of the upper and lower surfaces of the at least one layer of electroactive material.
- 20 4. The electroactive device of claim 3, wherein the at least one electrode is a conductive polymer material having elasticity comparable to the at least one layer of electroactive material and having good adherence to the at least one electroactive material.
- 25 5. The electroactive device of claim 2, wherein the applied amplitude of the electrical signals controls the range of device motion.
6. The electroactive device of claim 1, wherein the at least one non-uniform thickness layer enables a controlled contouring of the activated device.
- 30 7. The electroactive device of claim 6, wherein the controlled contouring comprises bending of the activated device.

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8. The electroactive device of claim 6, wherein the controlled contouring comprises torsion of the activated device.

9. The electroactive device of claim 1, wherein the non-uniform 5 thickness of at least one layer is a function of at least one dimension of the layer.

10. The electroactive device of claim 1, wherein the non-uniform thickness of at least one layer is a function of both the length and width of the 10 layer.

11. The electroactive device of claim 1, wherein two or more layers of material are electroactive.

15 12. The electroactive device of claim 1, wherein one layer of material is non-electroactive.

13. The electroactive device of claim 12, wherein the non- 20 electroactive material is selected from the group consisting of polymers, ceramics, composites and metals.

14. The electroactive device of claim 1, wherein the electroactive material is a material that responds to electrical activation.

25 15. The electroactive device of claim 1, wherein the electroactive material is selected from the group consisting of polymers, ceramics, and composites.

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16. The electroactive device of claim 1, wherein the electroactive material is an electrostrictive graft elastomer comprising a backbone molecule which is a non-crystallizable, flexible macromolecular chain, and a grafted polymer forming polar graft moieties with backbone molecules, the polar graft moieties having been rotated by an applied electric field and sustained in the rotated state until the electric field is removed.

17. The electroactive device of claim 1, wherein the cross-section of at least one non-uniform layer is defined by a function of the distance along the length of the layer.

18. The electroactive device of claim 1, wherein the cross-section of at least one non-uniform layer is defined by a function of the distance along the width of the layer.

19. The electroactive device of claim 1, wherein the cross-section of at least one non-uniform layer is defined by a function of both the distance along the length of the layer and the distance along the width of the layer.

20. The electroactive device of claim 1, wherein the layers of the device are conformable for use in folded deployable devices.

21. The electroactive device of claim 1, wherein the means for bonding the layers is selected from the group consisting of chemical bonding, physical bonding, mechanical bonding, and biological bonding.

22. An electroactive device as claimed in claim 1, wherein the means for bonding the layers is a chemical bonding means employing a chemical adhesive.

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23. The electroactive device of claim 1, wherein the device itself is a membrane to be deformed.

24. The electroactive device of claim 23, wherein the membrane is 5 a reflector.

25. The electroactive device of claim 1, wherein at least one device is positioned along the surface of a structure to modify the surface's contour.

10 26. The electroactive device of claim 25, wherein the surface to be modified is a skin surface.

15 27. The electroactive device of claim 26, wherein the device produces traveling waves.

20 28. The electroactive device of claim 25, wherein the surface to be modified is a display panel.

29. The electroactive device of claim 25, wherein the surface to be 20 modified is an optical index layer for a liquid crystal display.

30. The electroactive device of claim 1, wherein at least one device is integrated within the surface of a structure to modify the surface's contour.

25 31. The electroactive device of claim 30, wherein the surface to be modified is a skin surface.

32. The electroactive device of claim 30, wherein the device produces traveling waves.

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33. The electroactive device of claim 1, wherein the device performs at least one function selected from the group consisting of shaping, tuning, positioning, controlling and deforming.

5 34. The electroactive device of claim 1, wherein the device is a component of a micro-electromechanical system.

35. The electroactive device of claim 1, wherein the device is a component of a nano-electromechanical system.

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